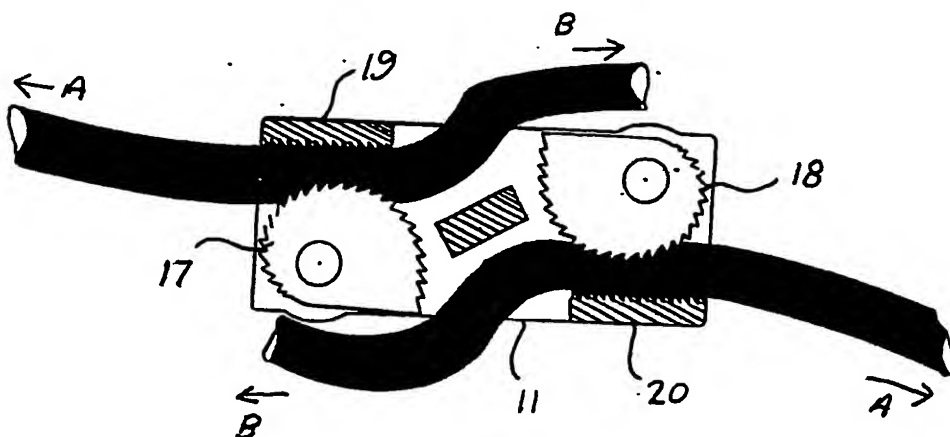




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 4 : <b>B65H 69/00, F16G 11/10</b>	<b>A1</b>	(11) International Publication Number: <b>WO 89/01455</b> (43) International Publication Date: 23 February 1989 (23.02.89)
<p>(21) International Application Number: PCT/AU88/00280</p> <p>(22) International Filing Date: 29 July 1988 (29.07.88)</p> <p>(31) Priority Application Number: 77294/87</p> <p>(32) Priority Date: 21 August 1987 (21.08.87)</p> <p>(33) Priority Country: AU</p> <p>(71)(72) Applicant and Inventor: DAVIES, Phillip, Edward [AU/AU]; 10 Buckinbah Place, Lilli Pilli, NSW 2229 (AU).</p> <p>(74) Agent: GRIFFITH HACK &amp; CO.; G.P.O. Box 4164, Sydney, NSW 2001 (AU).</p> <p>(81) Designated States: AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent).</p>		<p>US.</p> <p><b>Published</b> <i>With international search report.</i></p>

(54) Title: AN APPARATUS FOR CONNECTING LENGTHS OF URETHANE CORD TOGETHER



## (57) Abstract

An apparatus for connecting lengths of urethane cord together comprises a rectangular body portion (11) having cam wheels (17, 18) located at diagonally opposed corners and restraining members (19, 20) at the remaining corners. The restraining members (19, 20) are rectangular in shape and face cam wheels (17, 18) respectively. Portions of urethane cord are arranged to be placed between the spaces provided between each cam wheel (17, 18) and its opposed restraining members (19, 20) and are arranged to be pulled in the "A" direction. Teeth are provided on the inner face of the restraining members (19, 20) and on a major part of the periphery of the cam wheels (17, 18). By pulling each urethane cord in the "A" direction as shown, the cam wheels (17, 18) are turned to reduce the space between each cam wheel (17, 18) and its opposed restraining member (19, 20) until each portion of urethane cord is held tightly therebetween. By pulling the portions of urethane cord in the "B" direction shown they can be released.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FR	France	ML	Mali
AU	Australia	GA	Gabon	MR	Mauritania
BB	Barbados	GB	United Kingdom	MW	Malawi
BE	Belgium	HU	Hungary	NL	Netherlands
BG	Bulgaria	IT	Italy	NO	Norway
BJ	Benin	JP	Japan	RO	Romania
BR	Brazil	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	LI	Liechtenstein	SN	Senegal
CH	Switzerland	LK	Sri Lanka	SU	Soviet Union
CM	Cameroon	LU	Luxembourg	TD	Chad
DE	Germany, Federal Republic of	MC	Monaco	TG	Togo
DK	Denmark	MG	Madagascar	US	United States of America
FI	Finland				

AN APPARATUS FOR CONNECTING LENGTHS  
OF URETHANE CORD TOGETHER

TECHNICAL FIELD

The principal application of the present invention is  
5 to the repair of surfboard legropes.

Once a surfboard legrope breaks, the common method for  
repairing it is to tie the two broken ends together in a  
knot. However, because of the elastic and slippery nature  
of urethane, a common legrope material, it is almost  
10 impossible to tie a suitable knot to join the two broken  
ends of the urethane cord and therefore, the legrope must be  
replaced.

DISCLOSURE OF THE INVENTION

According to the present invention there is provided an  
15 apparatus for connecting portions of a flexible elongate  
member together comprising a first and second cam surface  
and a first and second restraining surface wherein a portion  
of flexible elongate member is arranged to be held between  
the first cam surface and first restraining surface and  
20 another portion of flexible elongate member is arranged to  
be held between the second cam surface and the second  
restraining surface.

The first and second cam surfaces preferably are  
located on first and second cam wheels respectively.

25 The first and second restraining surfaces preferably  
are located on first and second restraining members  
respectively.

It is preferred that the first and second cam surfaces  
and restraining surfaces comprise teeth which are arranged  
30 hold their respective portions of flexible elongate member.

It is preferred that the first and second restraining  
surfaces lie opposite the first and second cam surfaces  
respectively.

The restraining members are preferably fixed.

35 Preferably the first and second cam members are  
supported on axles.

Preferably during a connecting process each portion of flexible elongate member is arranged to turn a respective one of the cam wheels in a manner which reduces the distance between each cam surface and its respective restraining surface.

The axles are preferably parallel and extend between side surfaces of the apparatus.

The axles of the cam members may be arranged to be held in grooves in the side surfaces of the apparatus.

According to one embodiment the grooves allow the axles and their respective cam wheels to be slid toward and away from their respective restraining surfaces.

Preferably the apparatus has a body portion which is substantially rectangular in shape.

Preferably the restraining surfaces are located at diagonally opposed corners of the body portion.

The restraining surfaces preferably extend parallel to the upper and lower surfaces of the body portion.

The grooves preferably extend parallel to the end surfaces of the body portion.

It is preferred that the portions of flexible elongate members are part of a single length of urethane cord which is used as legrope for surfboards.

According to one embodiment the body portion has lug portions which are arranged to facilitate its connection to an ankle strap.

Preferably stainless steel rings are used to attach the apparatus to an ankle strap in conjunction with the lugs.

#### BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 shows a sectional view of an apparatus for connecting together lengths of urethane cord; and

Figure 2 shows the apparatus connecting two lengths of urethane cord together.

MODES FOR CARRYING OUT INVENTION

Referring to Figure 1, the apparatus comprises a body portion 11 which is substantially rectangular in shape.

5 The body portion 11 comprises two side surfaces, only one of which is shown in Figure 1.

Each side surface 12 has vertical slots 13 and 14 at each end which are arranged to slidably support axles 15 and 16 of cam wheels 17 and 18.

10 At diagonally opposed corners at the upper left and lower right of the body portion 11, restraining members 19 and 20 are located. These are effectively rectangular members having saw-toothed horizontal inner surfaces 19a and 20a which are arranged perpendicular to slots 13 and 14 respectively.

15 The cam wheels 17 and 18 have saw-toothed cam surfaces 21 and 22 respectively around a major part of their peripheries and smooth straight surfaces 23 and 24 respectively around the remainder of their peripheries.

20 The cam wheels 17 and 18 may be turned on their axles so as to either increase or decrease the distance between the respective opposing restraining members 19 and 20.

By placing portions of urethane cord between the restraining member 19 and cam wheel 17 and the restraining member 20 and cam wheel 18 and pulling each portion of  
25 urethane cord in the direction shown by the arrows A, cam wheels 17 and 18 respectively are turned by the action of the teeth of each cam wheel gripping its respective portion of urethane cord. The harder each portion of urethane cord is pulled, the further the respective cam wheels 17, 18 are  
30 turned so that the distance between the restraining members 19, 20 and their opposing cam wheel saw-toothed surfaces is reduced.

Eventually, a stage will be reached at which point each portion of urethane cord is tightly held between respective  
35 ones of the restraining members and cam wheels, thus providing a connection between the two portions of urethane

cord.

The portions of urethane cord may be released by pulling them in the direction indicated by the arrows B, thus reversing the action performed during a tightening operation described previously.

A separating member 25 is located at the centre of the apparatus between the cam wheels and serves to provide a partition which prevents separate portions of urethane cord from interfering with each other during a connection operation.

Although not shown, the apparatus may comprise lugs which allow it to be connected to an ankle strap by means of stainless steel rings or the like.

## CLAIMS

1. An apparatus for connecting flexible longated members together comprising a first and second cam surface (21, 22) and a first and second restraining surface (19, 20) wherein a portion of flexible elongate member is arranged to be held between the first cam surface (21) and first restraining surface (19a) and another portion of flexible elongate member is arranged to be held between the second cam surface (22) and the second restraining surface (20a).

2. An apparatus according to claim 1 wherein the first and second cam surfaces (21, 22) are located on first and second cam wheels (17, 18) respectively.

3. An apparatus according to any claim 1 wherein the first and second restraining surfaces (19a, 20a) are located on first and second restraining members (19, 20) respectively.

4. An apparatus according to claim 2 wherein the first and second cam surfaces (21, 22) and the first and second restraining surfaces (19a, 19b) comprise teeth which are arranged to grip the portions of elongate member.

5. An apparatus according to claim 4 wherein each flexible elongate member is arranged to turn a respective one of the cam wheels in a manner which reduces the distance between each cam surface and its respective restraining surface.

6. An apparatus according to claim 4 wherein the cam wheels are supported on axles (15, 16) which are parallel and extend between side surfaces of the apparatus.

7. An apparatus according to claim 4 wherein the axles (15, 16) and their cam wheels (17, 18) are arranged to be held in grooves (13, 14) in the side surfaces of the apparatus.

8. An apparatus according to claim 7 wherein the grooves (13, 14) allow the axles (15, 16) to be slid toward and away from their respective restraining surfaces (19a, 20a).

9. . An apparatus according to claim 7 wherein the restraining surfaces (19a, 20a) are located at diagonally opposed corners of the apparatus.

5 10. An apparatus substantially as hereinbefore described with reference to the accompanying drawings.

10

15

20

25

30

35

**SUBSTITUTE SHEET**



1/1

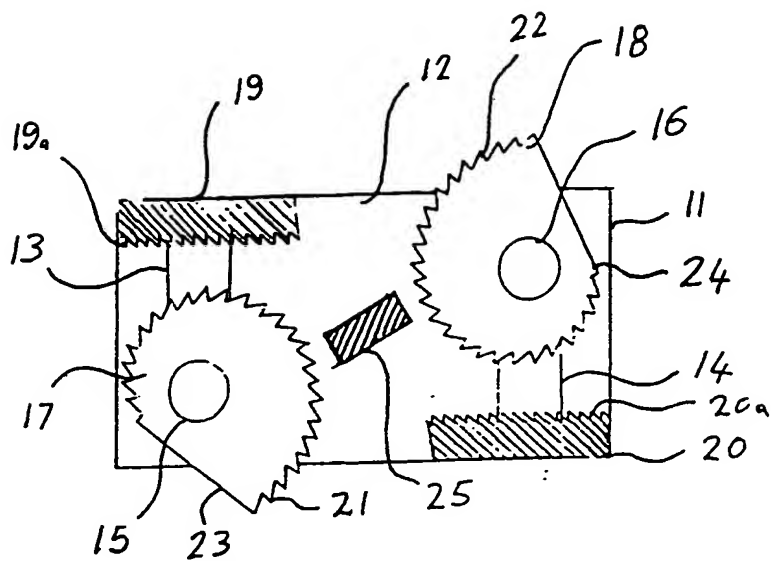


FIG 1

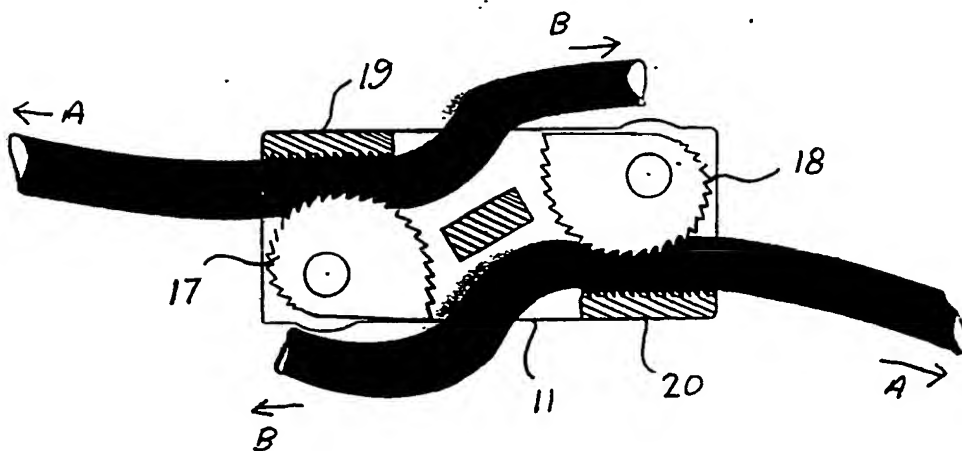
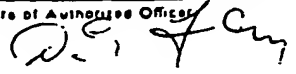


FIG 2

# INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 88/00280

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> : (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)		
According to International Patent Classification (IPC) or to both National Classification and IPC Int. Cl. <sup>4</sup> B65H 69/00, F16G 11/10		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched :		
Classification System	Classification Symbols	
IPC	B65H 69/00, F16G 11/10	
Documentation Searched other than Minimum Documentation to the extent that such documents are included in the fields searched :		
AU : IPC as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages **	Relevant to Claim No. **
X	AU,A, 43122/58 (231741) (GESTER) 7 May 1959	(1-3)
Y	(07.05.59)	(4-9)
X	AU,A, 41131/72 (464191) (WATSON) 18 October 1973	(1-3)
Y	(18.10.73)	(4-9)
X	US,A, 3564664 (DAGE) 23 February 1971 (23.02.71)	(1-3)
Y		(4-9)
X	AU,A, 39989/72 (473990) (LACREX BREVETTI SA)	(1,3)
Y	20 September 1973 (20.09.73)	(2,4-9)
Y	AU,A, 16380/76 (521635) (FEDER) 2 February 1978	(1-9)
	(02.02.78)	
Y	AU,A, 22437/70 (465336) (AB GUSTAVSBERGS FABRIKER)	(1-9)
	25 May 1972 (25.05.72)	
Y	US,A, 4541149 (JENSEN) 17 September 1985 (17.09.85)	(1-9)
Y	GB,A, 2181479 (LOWERY) 23 April 1987 (23.04.87)	(1-9)
Y	EP,A, 148287 (BODEN) 17 July 1985 (17.07.85)	(1-9)
Y	AU,A, 31339/63 (265722) (LAVIANO) 3 December 1964	(1-9)
	(03.12.64)	
* Special categories of cited documents : - "A" document defining the general state of the art which is not considered to be of particular relevance - "E" earlier document but published on or after the international filing date - "L" document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) - "O" document referring to an oral disclosure, use, exhibition or other means - "P" document published prior to the international filing date but later than the priority date claimed - "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention - "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step - "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents such combination being obvious to a person skilled in the art - "A" document member of the same patent family		
<b>IV. CERTIFICATE</b>		
Date of the Actual Completion of the International Search 7 October 1988 (07.10.88)		Date of Mailing of this International Search Report 21 OCTOBER 1988 (21.10.88)
International Searching Authority Australian Patent Office		Signature of Authorised Officer  D.G. FRY

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON  
INTERNATIONAL APPLICATION NO. PCT/AU 88/00280

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Members			
US	3564664	DE	1625856	GB	1214143
AU	16380/76	BR	7605006	CA	1062885
		DK	3432/76	FR	2319817
		IT	1067492	JP	52018568
		SE	7608550	US	4084532
				DE	2534474
				GB	1546553
				NL	7608261
				ZA	7604606
AU	22437/70	BE	759000	CH	525411
		FR	2069451	GB	1283277
				DE	2058464
				NL	7017144
US	4541149	DK	621/83	EP	117466
GB	2181479	US	4660493		

END OF ANNEX